



**Water Protection Bureau**  
**Montana Pollutant Discharge Elimination System (MPDES) Fact Sheet**

<b>Permit Number:</b>		MT0020460
<b>Permittee:</b>		Yellowstone Boys and Girls Ranch County Water/Sewer District
<b>Receiving Water:</b>		Canyon Creek
<b>Facility Information:</b>		
<b>Name:</b>		Yellowstone Boys and Girls Ranch
<b>Location:</b>		45.7378°, -108.69689° 17320 South 72 <sup>nd</sup> St. West Billings, MT 59601 Yellowstone County
<b>Contact:</b>		Curtis Lord, Plant Director 17320 South 72 <sup>nd</sup> St. West Billings, MT 59601
<b>Fee Information:</b>		
<b>Type of Facility:</b>		Minor Publicly Owned Treatment Works
<b>Number of Outfalls:</b>		1 (for fee determination only)
<b>Outfall Type:</b>		001 – Treated Wastewater
<b>Outfall Location:</b>		45.73861°, -108.69648°
<b>Fact Sheet Date:</b>		July 2022

## I. Summary

The Montana Department of Environmental Quality (DEQ) proposes to renew the Montana Pollutant Discharge Elimination System (MPDES) permit issued to Yellowstone Boys and Girls Ranch County Water/Sewer District for the Yellowstone Boys and Girls Ranch (YBGR), MT0020460. This fact sheet documents the legal requirements and technical rationale that serve in the decision-making process involved with developing effluent limits, monitoring and reporting requirements, and special conditions which are specific to YBGR.

### A. Permit Status

- March 1, 2015 Previous permit (2015 Permit) became effective.
- June 23, 2017 DEQ received a request to transfer the permit from Yellowstone Boys and Girls Ranch to Yellowstone Boys & Girls Ranch County Water/Sewer District.
- July 13, 2017 DEQ issued a minor modification to the permit transferring permit coverage from Yellowstone Boys and Girls Ranch to Yellowstone Boys & Girls Ranch County Water/Sewer District.
- December 18, 2019 DEQ received MPDES permit renewal application (Forms 1 and 2A) and applicable fees.
- February 5, 2020 DEQ administratively continued the 2015 Permit.

### B. Proposed Changes to Effluent Limits and Monitoring Requirements

- Correct coordinates of Outfall 001 to 45.73861°, -108.69648° to reflect discharge from Cell #3.
- The TRC, total nitrogen, and total phosphorus monitoring requirements will be removed.
- YBRC will no longer be required to report minimums of weekly averages for BOD<sub>5</sub> effluent, TSS effluent.
- Monitoring of flow (mgd) will be replaced by duration of discharge (days per month).
- Effluent pH monitoring requirements will be increased to weekly.
- Influent BOD<sub>5</sub> and TSS requirements monitoring will be increased to weekly.
- An effluent oil & grease maximum daily limit of 10 mg/L will be included in this permit.
- Ambient ammonia monitoring will be required quarterly.

## II. Facility Information

### A. Facility Description and Design Criteria

YGBR is a privately owned non-profit facility that provides support for youth struggling with alcohol, drug, and psychiatric conditions. YGBR serves 330 full-time residents, staff, and staff families and 100 part time residents and visitors. Although the facility is privately owned, publicly owned YGBR Water/Sewer District operates the wastewater treatment plant that treats sewage from the facility. YGBR Water/Sewer District has contracted with Peak Water Services (formerly Advanced Pump and Equipment) to perform lagoon, lift station, and water systems checks once a week and perform sampling. Curtis Lord still oversees the general facility operation.

The wastewater treatment system was originally built in 1978 as a two-cell lagoon system. It was upgraded to a three-cell system in 1997. YGBR entered into an order on consent (AOC) in 2010 and was required to upgrade the system to comply with the MPDES permit. Additional upgrades were completed in August 2019 to comply with the AOC. The 2019 upgrades included lining all three cells, aerating Cell #1 and Cell #2, adding a limestone filter, and changing the system to operate exclusively in series.

YGBR Water/Sewer District operates a three-cell aerated lagoon system to treat waste from the facility. The system is operated in series, with Cell #1 discharging to Cell #2; Cell #2 discharging to a limestone filter system; and the limestone filter system discharging to Cell #3. All three cells are lined, and Cell #1

and Cell #2 are aerated. There is a discharge control structure between Cell #2 and the limestone filter to control water depth in ponds and ensure adequate holding times. The facility discharges intermittently, and Cell #3 is used to store treated effluent between discharge periods. The facility discharges from Cell #3 to Canyon Creek via Outfall 001. *Table 1* provides the facility design criteria for YGBR.

<b>Table 1. YGBR Facility Design Criteria</b>	
<b>Construction Date:</b> 1978	<b>Upgrade Date:</b> 2019
<b>Average Daily Design Flow:</b> 0.0212 mgd	<b>Maximum Daily Design Flow:</b> 0.045 mgd
<b>Average Influent Flow Estimate:</b> 0.015 mgd	
<b>Design Population:</b> 450	<b>Current Population:</b> 330 full time, 100 part-time
<b>Primary Cells:</b> 2	<b>Secondary Cells:</b> 1
<b>Cell Surface Area:</b> 0.82 acres (Cell #1), 0.98 acres (Cell #2), 1.43 acres (Cell #3)	<b>Cell Depth (without sludge):</b> 3.0 ft (Cell #1), 3.3 ft (Cell #2), 3.2 ft (Cell #3)
<b>Aerated Cells:</b> 2	<b>Design Detention Time:</b>
<b>Disinfection:</b> None	<b>Type of Discharge:</b> Intermittent
<b>Design BOD<sub>5</sub> Removal:</b> 96% (winter), 98% (summer)	<b>Design BOD<sub>5</sub> Load:</b> Unknown
<b>Design SS Removal Rate:</b> Unknown	<b>Design SS Load:</b> Unknown
<b>Bypass Events:</b> None	<b>Estimated I/I:</b> Unknown
<b>SSO Events:</b> None	

## B. Existing Permit Limits

The effluent limits for YGBR established in the 2015 Permit are presented in Table 2.

<b>Table 2. 2015 Permit Limits</b>				
Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
5-Day Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L	30	45	--
	% removal	85%	--	--
	lb/day	5.8	8.6	--
Total Suspended Solids (TSS)	mg/L	45	65	--
	% removal	65%	--	--
	lb/day	8.6	12.5	--
pH	s.u.	Within the range of 6.0 to 9.0		
<i>E. coli</i> - Summer <sup>(1)</sup>	cfu/100 mL	126	252	--
<i>E. coli</i> - Winter <sup>(2)</sup>	cfu/100 mL	630	1260	--
Total Ammonia, as N	mg/L	2.7	--	5.9
(1) Limit applies during the period April 1 through October 31.				
(2) Limit applies during the period November 1 through March 31.				

### C. Existing Permit Monitoring Requirements

The effluent monitoring requirements for Outfall 001 and ambient monitoring requirements established in the 2015 Permit are presented in *Table 3* and *Table 4***Error! Reference source not found.**, respectively.

Table 3. 2015 Permit Effluent Monitoring Requirements		
Parameter	Units	Sample/Calculation Frequency
Flow	mgd	5 Days/Week
	# days	Monthly
BOD <sub>5</sub>	mg/L	1/Week
	% removal <sup>(1)</sup>	1/Month
	lb/day	1/Month
BOD <sub>5</sub> - Influent	mg/L	1/Month
	mg/L	1/Week
TSS	% removal <sup>(1)</sup>	1/Month
	lb/day	1/Month
	mg/L	1/Month
TSS- Influent	mg/L	1/Month
	s.u.	1/Month
pH	Y/N	1/Month <sup>(2)</sup>
	mg/L	1/Year <sup>(2)</sup>
Oil & Grease	cfu/100 mL <sup>(3)</sup>	1/Week
	mg/L	5 Days/Week <sup>(4)</sup>
Total Residual Chlorine (TRC)	mg/L	1/Week
Total Ammonia, as N	mg/L	1/Month
Nitrate + Nitrite, as N	mg/L	1/Month <sup>(5)</sup>
Total Kjeldahl Nitrogen	mg/L	1/Month <sup>(5)</sup>
Total Nitrogen, as N <sup>(6)</sup>	mg/L	1/Month <sup>(5)</sup>
	lb/day	1/Month <sup>(5)</sup>
Total Phosphorus, a P	mg/L	1/Month <sup>(5)</sup>
	lb/day	1/Month <sup>(5)</sup>
(1) Percent (%) removal shall be calculated using the monthly average values. (2) A sample must be taken any time an oil sheen is observed, and at least once per month. If an oil sheen is observed, YGBR must analyze a grab sample using a 40 CFR 136 approved method. A minimum of one oil and grease sample shall be analyzed annually, even if no oil sheen is observed. (3) Any 40 CFR 136 method that can provide units of cfu/100 mL is acceptable either directly or through use of a translator from most probable number (MPN). (4) Sampling is only required if chlorine is used as a disinfectant in the treatment process. (5) Monitoring only required during July, August, and September. (6) Calculated as the sum of nitrate + nitrite and total Kjeldahl nitrogen concentrations.		

<b>Table 4. 2015 Permit Ambient Monitoring Requirements</b>		
Parameter	Units	Sample/Calculation Frequency
Flow	cfs	1/Quarter <sup>(1)</sup>
pH	s.u.	1/Quarter <sup>(1)</sup>
Temperature	°C	1/Quarter <sup>(1)</sup>
Nitrate + Nitrite, as N	mg/L	1/Quarter <sup>(1)(2)</sup>
Total Kjeldahl Nitrogen (TKN)	mg/L	1/Quarter <sup>(2)</sup>
Total Phosphorus, a P	mg/L	1/Quarter <sup>(2)</sup>
(1) Monitoring only required during 2017, 2018, and 2019.		
(2) Monitoring only required during July, August, and September.		

## D. Effluent Quality

Effluent data from August 2019 through April 2022 were selected to represent the period of record (POR). These data are considered representative of the facility's effluent quality because YGBR finished its facility upgrades in August 2019. YGBR does not use chlorine to treat wastewater, so TRC was not sampled. YGBR did not discharge from July-September, so no total phosphorus, TKN, or total nitrogen data was collected. *Table 5* summarizes effluent data at Outfall 001 for the POR as reported on discharge monitoring reports (DMRs).

<b>Table 5. Effluent Characteristics for the POR – Outfall 001</b>					
Parameter	Units	Minimum Value	Maximum Value	Average Value <sup>(1)</sup>	Sample Size
Flow	mgd	0.005	0.104	0.028	7
	days	4	19	13	7
BOD <sub>5</sub>	mg/L	3	25	13	14
	% removal <sup>(1)</sup>	65.56	97.10	90.84	7
TSS	lb/day	0.57	8.34	2.05	7
	mg/L	<10	59.0	24.71	14
	% removal <sup>(1)</sup>	64.02	97.32	84.08	7
pH	s.u.	7.68	9.00	8.40	7
Oil & Grease	mg/L	ND	ND	ND	3
<i>E. coli</i>	cfu/100 mL	<1	60	7.15	14
Total Ammonia, as N	mg/L	<0.05	2.24	0.61	14
Nitrate + Nitrite, as N	mg/L	0.01	0.28	0.10	8
(1) For values reported below the detection limit, the detection limit was used in calculations.					
(2) Facility reported loading of 0 lb/day when TSS concentration was below the detection limit.					

## E. Compliance History

In November 2020 YGBR had two exceedances for TSS loading, one TSS percent removal violation, and one TSS concentration exceedance. These violations were attributed to a facility upset, and not operation and maintenance issues. YGBR also had two TSS loading exceedances and one BOD<sub>5</sub> percent removal violation in March 2021. The facility has had no exceedances since March 2021.

YGBR had one inspection during the last permit cycle, on December 29, 2019. The facility was cited for failure to report data, incorrect reporting, and failure to conduct analysis of samples.

### III.Receiving Water

#### A. Receiving Water Summary

The following information about the receiving water was used to develop water quality-based effluent limits.

- Water Use Classification: B-2
- Waterbody Name/Location: Canyon Creek, Highway 532 to the mouth of the Yellowstone River
- Montana Stream Segment: MT43F002\_021
- Basin: Yellowstone
- USGS Hydrologic Unit Code (HUC 12): 100700040904
- HUC 12 Name: Lower Canyon Creek
- Gauging Stations: DNRC 43Q 09500 (Canyon Creek, MT)
- 7Q10: 1.45 mgd (2.7 cfs)
- Seasonal 14Q5: 28.15 mgd (52.3 cfs)
- Ecoregion: Northwestern Great Plains
- Beneficial Use Status: Not fully supporting aquatic life
- Impairment Listing: 2020 Montana Water Quality Integrated Report
- Total Maximum Daily Load (TMDL): None

#### B. Water Use Classification

ARM 17.30 Subchapter 6 defines water use classifications for state waters and the numeric and narrative standards that protect those uses. Canyon Creek is classified as B-2 according to the Montana Water Use Classifications. In order to protect the beneficial uses, state waters classified B-2 are to be maintained suitable for:

- Drinking, culinary, and food processing purposes, after conventional treatment;
- bathing, swimming, and recreation;
- growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and
- agricultural and industrial water supply.

#### C. Impairments

Montana's 2020 Water Quality Integrated Report lists one impairment for the segment of Canyon Creek that YGBR discharges to (MT43F002\_021). Canyon Creek is impaired for flow regime modification with water diversions listed as the probable source of impairment. YGBR does not divert water from the creek, so is not considered a likely to be a source of impairments.

#### D. Applicable Water Quality Standards

Each waterbody classification has numeric and narrative water quality standards designed to ensure that beneficial uses are protected. Discharges to B-2 classified waters are subject to the following water quality standards:

- Administrative Rules of Montana 17.30 Subchapter 6
- Department Circular DEQ-7, Numeric Water Quality Standards

All dischargers are subject to:

- Administrative Rules of Montana 17.30 Subchapter 5; Mixing Zones
- Administrative Rules of Montana 17.30 Subchapter 7; Nondegradation of Water Quality

#### E. Ambient Water Quality

The 2015 Permit required YBGR to monitor flow, pH, temperature, nitrate + nitrite, TKN, and total phosphorus in Canyon Creek. Ambient water quality data was collected by YGBR from 2017-2019.

Ambient data are summarized in *Table 6*. DEQ uses upper bound of the interquartile range (75<sup>th</sup> percentile) of the available data for a given pollutant to determine the assimilative capacity of the receiving water.

<b>Table 6. Canyon Creek Ambient Water Quality</b>					
Parameter	Units	Minimum Value	Maximum Value	75 <sup>th</sup> Percentile	Sample Size
Stream Flow	mgd	4.1	95.7	86.6	17
pH	s.u.	7.4	9.5	8.8	11
Temperature	°C	1.3	21.3	15.2	11
Nitrite + Nitrate, as N	mg/L	0.1	5.5	1.4	17
TKN, as N	mg/L	0.0	1.5	0.7	8
Total Nitrogen, as N	mg/L	0.09	5.5	2.0	17
Total Phosphorus, as P	mg/L	0.13	0.3	0.2	7

## F. Low Flow

There are no active stream gages upstream or near YGBR. There is a DNRC stream gage (DNRC 43Q 09500) located 4 miles downstream of YGBR's outfall on Canyon Creek. The drainage area at YGBR's outfall is 96% of the DNRC gage drainage area, so the DNRC gage is considered representative. DEQ prefers to use at least ten years of data to calculate the seven-day low flow recurring every 10 years (7Q10) and a minimum of five years of data are required for calculating the seasonal 14-day low flow recurring every five years (14Q5). The DNRC gage has been collecting data for six years (5/5/2016-5/28/2022), and the data from the gage was considered appropriate to use for low flow statistics calculations.

The calculated 7Q10 is 1.74 mgd (2.7 cfs) and the calculated 14Q5 is 33.79 mgd (52.3 cfs). Canyon Creek is influenced by irrigation management practices. Future stream management decisions could alter low flows, and it may be appropriate recalculate low flow statistic in the next permitting cycle if there are changes to stream management practices in Canyon Creek. DEQ recommends that flow patterns on Canyon Creek that stream management and flows in Canyon Creek

## IV. Technology-Based Effluent Limits

### A. Applicable Effluent Limit Guidelines

Technology-based effluent limits (TBELs) represent the minimum level of control that must be implemented in MPDES permits. These limits are developed based on currently available treatment technologies and must be met prior to dilution. The Montana Board of Environmental Review has adopted by reference 40 CFR 133, which defines the minimum levels of secondary treatment for POTWs that use a trickling filter or a waste stabilization pond (lagoon) for the biological treatment of municipal wastewater. Secondary treatment is defined in terms of effluent quality as measured by BOD<sub>5</sub>, TSS, pH, and percent removal of BOD<sub>5</sub> and TSS.

#### 1. Secondary Treatment Standards

National Secondary Standards (NSS) are the most stringent secondary treatment requirements. Facilities may be eligible for less stringent limits for BOD<sub>5</sub> and TSS called Treatment Equivalent to Secondary Standards (TES) if:

- Through proper operation and maintenance, the 95<sup>th</sup> percentile of the facility's monthly average data for a period of at least the last two years exceeds NSS limits for TSS and BOD<sub>5</sub>;
- A trickling filter or waste stabilization pond (lagoon) is the principal treatment process; and
- The facility uses biological treatment that achieves monthly averages of at least 65% removal.

The period of record (POR) that was chosen as representative of YGBR's discharge is August 2019-April 2022, as discussed in *Section II(D)*, was used to evaluate the appropriate level of treatment for BOD<sub>5</sub> and TSS. As discussed in *Section III(E)*, there was a facility upset in November 2020, not attributable to improper operation and maintenance. Data from this month will be excluded from TBEL calculations, as it is not representative of YGBR's discharge.

#### BOD<sub>5</sub> Effluent History and Proposed Limits

- In the 2015 Permit, effluent limits were set to NSS for BOD<sub>5</sub> (30 mg/L monthly average, 45 mg/L weekly average).
- The 95<sup>th</sup> percentile of monthly average data for BOD<sub>5</sub> during the POR was 18.9 mg/L.
- YGBR demonstrated it can meet NSS, therefore BOD<sub>5</sub> limits will not change.

#### TSS Effluent History and Proposed Limits

- In the 2015 Permit, effluent limits were set to TES for TSS (45 mg/L monthly average, 65 mg/L weekly average).
- The 95<sup>th</sup> percentile of monthly average data for TSS during the POR was 30.2 mg/L.
- The average percentage removal of TSS for the POR was 87.42%.
- YGBR demonstrated that the 95<sup>th</sup> percentile of TSS data exceeds NSS limits of 30 mg/L and achieves an average monthly removal greater than 65%, with proper operation and maintenance.
- YGBR will retain TES limits for TSS.

## B. Load Limits

Determining load limits for pollutants with TBELS is a three-step process. First, nondegradation load limits are compared to actual pollutant loading. Next, load limits are calculated from the proposed concentration limit. Final load limits are determined by comparing calculated limits to previous limits.

### 1. Calculated Load Limits

Effluent limits must be expressed in terms of mass and identified as load (lb/day) when appropriate and feasible. The mass loading limits for BOD<sub>5</sub> and TSS are calculated based on the facility's design flow, TBEL concentrations as discussed in Section IV(A)(1), and a conversion factor. See calculations below.

$$\text{Load Limit} = \frac{\text{Average Daily Design Flow}}{\text{Design Flow}} \cdot \frac{\text{Concentration Limit}}{\text{Limit}} \cdot \frac{\text{Conversion Factor}}{\text{Factor}}$$

$$\text{BOD}_5: \text{ Monthly Load Limit} = 0.021 \text{ mgd} \cdot 30 \frac{\text{mg}}{\text{L}} \cdot 8.34 \frac{\text{lb} \cdot \text{L}}{\text{Mgal} \cdot \text{mg}} = 5.3 \frac{\text{lb}}{\text{day}}$$

$$\text{Weekly Load Limit} = 0.021 \text{ mgd} \cdot 45 \frac{\text{mg}}{\text{L}} \cdot 8.34 \frac{\text{lb} \cdot \text{L}}{\text{Mgal} \cdot \text{mg}} = 8.0 \frac{\text{lb}}{\text{day}}$$

$$\text{TSS: Monthly Load Limit} = 0.021 \text{ mgd} \cdot 45 \frac{\text{mg}}{\text{L}} \cdot 8.34 \frac{\text{lb} \cdot \text{L}}{\text{Mgal} \cdot \text{mg}} = 8.0 \frac{\text{lb}}{\text{day}}$$

$$\text{Weekly Load Limit} = 0.021 \text{ mgd} \cdot 65 \frac{\text{mg}}{\text{L}} \cdot 8.34 \frac{\text{lb} \cdot \text{L}}{\text{Mgal} \cdot \text{mg}} = 11.5 \frac{\text{lb}}{\text{day}}$$

### 2. Nondegradation Load Allocations

Montana's nondegradation policy protects state waters from degradation due to new or increased pollution sources. A facility is considered a new or increased source if it exceeds the load limits established in its current permit or the limits from a permit issued by DEQ prior to April 29, 1993.

Typically, nondegradation load limits are compared to a facility's actual average monthly loading for the past five years. Since the YGBR completed a facility upgrade in August 2019, only data from August 2019-April 2022 will be used. *Table 7* shows a comparison between the 2015 Permit load limits (i.e. nondegradation limits) and actual loading based on data obtained from DMRs, unless otherwise noted. YGBR did not exceed its nondegradation load allocations for BOD<sub>5</sub> or TSS and will not be considered a new or increased source.



<b>Table 7. Comparison of Nondegradation and Actual Mass Loading</b>					
<b>Nondegradation Load Allocation</b>		<b>Actual Average Monthly Load (lb/day)</b>			
Parameter	Load (lb/day)	2019	2020	2021	2022
BOD <sub>5</sub>	5.8	1.2	1.1	1.7	1.6
TSS	8.6	3.8 <sup>(1)</sup>	3.2	4.0	1.4
(1) Facility reported non detect for this period. Loading was calculated from detection limits on laboratory data sheets and flow data.					

### 3. Load Limit Comparison

Final average monthly load limits are determined by comparing the load limits calculated in the previous section with load limits in the 2015 Permit. The calculated load limits are more protective than the 2015 Permit limits of average monthly load limit of 5.8 lb/day and average weekly load limit of 8.6 lb/day for BOD<sub>5</sub> and an average monthly load limit of 8.6 lb/day and 12.5 lb/day for TSS. Therefore, the facility will be held to the more stringent calculated load limits.

## C. Proposed Technology-Based Effluent Limits

YGBR will be held to TBELs based on NSS for BOD<sub>5</sub>, and pH and TES for TSS, as summarized in *Table 8*.

<b>Table 8. Technology-Based Effluent Limits – Outfall 001</b>			
Parameter	Units	Average Monthly Limit	Average Weekly Limit
BOD <sub>5</sub>	mg/L	30	45
	lb/day	5.3	8.0
	% removal	85%	--
TSS	mg/L	45	65
	lb/day	8.0	11.5
	% removal	65%	--
pH	s.u.	6.0 – 9.0 (instantaneous)	

## V. Water Quality-Based Effluent Limits

### A. Scope and Authority

MPDES permits must include water quality-based effluent limits (WQBELs) when TBELs do not sufficiently protect state waters. Permits must include limits on all pollutants which will cause, or have reasonable potential to cause, an excursion of water quality standards. Montana water quality standards define both water use classifications for all state waters and numeric and narrative standards that protect those designated uses. Discharge from YGBR must comply with the general prohibitions set forth in ARM 17.30.637. The general prohibitions require that state waters, including mixing zones, be free from substances which will:

- settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;
- create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter), or globules of grease or other floating materials;
- produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;
- create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and
- create conditions which produce undesirable aquatic life.

## B. Pollutants of Concern

Pollutants and parameters are identified as a pollutant of concern (POC) for the following reasons:

- Listed as TBELs;
- Identified as needing WQBELs in the previously issued permit;
- Identified as present in effluent monitoring or otherwise expected present in the discharge; or
- Associated with impairment which may or may not have a wasteload allocation (WLA) in a TMDL

Table 9 summarizes the POCs identified for YGBR. Identification of a POC is not an indication that a WQBEL is necessary, but an indication that further evaluation is required.

Table 9. Parameters of Concern for WQBELs	
Parameter	Basis for Identification
<b>Conventional Pollutants</b>	
BOD <sub>5</sub> , TSS, pH	TBEL, Previous Permit
<i>E. coli</i> , Oil & Grease	WQBEL, Previous Permit
<b>Nonconventional Pollutants</b>	
TRC, Total Ammonia, Nitrate + Nitrite, TKN, Total Nitrogen, Total Phosphorus	Required monitoring, previous permit

## C. Mixing Zones

A mixing zone is an area established in a permit or final decision on nondegradation where the effluent mixes with the receiving water and certain water quality standards may be exceeded. Any mixing zone that is granted must be clearly defined, be of the smallest practicable size, have a minimum practicable effect on water uses, and comply with nondegradation policy. Mixing zones are granted on a parameter-by-parameter basis and are not granted for parameters with TBELs. Chronic aquatic life standards and standards based on human health must not be exceeded beyond the boundaries of a surface water mixing zone. Acute aquatic life (acute) standards for any parameter may not be exceeded in any portion of the mixing zone unless

DEQ finds that allowing minimal initial dilution will not threaten or impair existing beneficial uses. The mixing zone granted in the 2015 Permit for total ammonia, as N (ammonia) will be continued. YGBR will be granted a standard mixing zone that extends 200 ft downstream from the point of discharge with 100% dilution of the 7Q10 for chronic ammonia standards. YBR will be granted an alternative mixing zone that extends 20 ft downstream from the point of discharge with 1% dilution of the 7Q10 for acute ammonia standards.

## D. Reasonable Potential Analysis

DEQ uses the statistical approach outlined in Chapter 3 of EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD) and a steady-state mass balance equation solved for  $C_r$  (Equation 1) to determine if there is reasonable potential (RP) for an individual parameter to exceed water quality standards. The main steps for determining RP are described below.

$$C_r = \frac{C_s \cdot Q_s + C_d \cdot Q_d}{Q_r} \quad (\text{Equation 1})$$

Where:

$C_r$  = in-stream pollutant concentration after discharge (calculated)

$C_s$  = receiving water ambient pollutant concentration (75<sup>th</sup> percentile of ambient water quality data)

$Q_s$  = receiving water critical flow (allowed dilution • 7Q10)

$C_d$  = critical effluent pollutant concentration ( $C_{\max}$  • TSD 3-2 multiplier)

$Q_d$  = critical effluent flow (average daily design flow)

$Q_r$  = in-stream flow after discharge ( $Q_s + Q_d$ )

## 1. Calculation of $C_d$

The projected critical effluent pollutant concentration ( $C_d$ ) is calculated using the maximum reported effluent concentration for the POR ( $C_{max}$ ) and the TSD 3-2 multiplier. The TSD 3-2 multiplier is used to account for effluent variability.  $C_d$  calculations are summarized in *Table 10*. Intermediate values in *Tables 10-11* are rounded.

- The multiplier is determined using the coefficient of variation (CV) of the effluent data and the 95<sup>th</sup> percentile confidence interval and probability bases of the effluent data.
- $CV = \frac{\text{standard deviation of monthly data}}{\text{average of monthly data}}$ ,
- A default CV of 0.6 is used when the dataset has less than 10 samples.

Table 10. Projected Critical Effluent Concentration ( $C_d$ )					
Parameter	CV	Sample Size →	TSD 3-2 Multiplier	• $C_{max}$	= $C_d$
Nitrate + Nitrite	0.6	8	1.90	0.28 mg/L	<b>0.53 mg/L</b>

## 2. Calculation of $C_r$ and Reasonable Potential Determination

- Receiving water critical flow ( $Q_s$ ) is calculated by multiplying allowed dilution by the 7Q10 (*Section III(A)*).
- The in-stream pollutant concentration after mixing ( $C_r$ ) is calculated using *Equation 1*.
- If  $C_r$  is greater than the water quality standard (WQS) there is reasonable potential to exceed water quality standards (RP), and a WQBEL is needed.

*Table 11* shows the  $C_r$  calculation and final RP determination. Nitrate + nitrite has no acute or chronic aquatic life standards. Nitrate + Nitrite did not demonstrate RP, so no WQBELs will be developed for this parameter.

Table 11. Reasonable Potential Analysis									
Parameter	Pollutant Concentration after Discharge ( $C_r$ )					Reasonable Potential (RP)			
	$(C_s \cdot Q_s + C_d \cdot Q_d) / Q_r$					$C_r$	< or > WQS	RP?	
	(mg/L)	(mgd)	(mg/L)	(mgd)	(mgd)	(mg/L)	(mg/L)		
<b>Nitrate+ Nitrite</b> Human Health	1.36	0.0	0.53	0.02	0.02	0.53	< 10	<b>No</b>	

# VI. Final Pollutant Evaluation

## A. Conventional Pollutants

**5-Day Biochemical Oxygen Demand ( $BOD_5$ ):**  $BOD_5$  is a typical effluent quality indicator for POTWs and is regulated through TBELs. TBELs provide adequate protection of water quality, and no WBELs will be required.

- Concentration: AML= 30 mg/L, AWL= 45 mg/L
- Load: AML=5.3 lb/day, AWL=8.0 lb/day
- Percent removal: AML=85%
- Weekly effluent monitoring requirements will be continued.
- Influent monitoring requirements will be increased to weekly.

**Total Suspended Solids (TSS):** TSS is a typical effluent quality indicator for POTWs and is regulated through TBELs. TBELs provide adequate protection of water quality, and no WBELs will be required.

- Concentration: AML= 45 mg/L, AWL= 30 mg/L
- Load: AML=8.0 lb/day, AWL=11.5 lb/day
- Percent removal: AML=65%
- Weekly effluent monitoring requirements will be continued.

- Influent monitoring requirements will be increased to weekly.

**pH:** pH is a typical effluent quality indicator for POTWs and is regulated through TBELs. TBELs provide adequate protection of water quality, and no WQBELs will be required for this parameter. Monitoring frequency will be increased so that a maximum and minimum pH can be reported monthly.

- Instantaneous minimum and maximum must be in the range of 6.0-9.0 s.u.
- The effluent monitoring requirement will be increased to weekly.

***Escherichia coli (E. coli):*** *E. coli* is a known pathogen in municipal wastewater systems. *E. coli* standards are set forth in the Montana Water Use Classifications set forth in ARM 17.30 Subsection 6. To protect human health and beneficial uses of the receiving water, no dilution is allowed. YGBR must meet the following standards applicable to all B-2 waterbodies:

- **Summer (April 1 through October 31):**
  - The geometric mean number of *E. coli* must not exceed 126 colony forming units per 100 milliliters (cfu/mL).
  - 10% of the total samples may not exceed 252 cfu per 100 mL during any 30-day period.
- **Winter (November 1 through March 31):**
  - The geometric mean number of *E. coli* must not exceed 630 cfu per 100 mL.
  - 10% of the total samples may not exceed 1,260 cfu per 100 mL during any 30-day period.
- The facility may report *E. coli* data as cfu per 100 mL or as most probable number (MPN).
- The weekly effluent monitoring requirement will be continued.

**Oil and Grease:** The general prohibitions set forth in ARM 17.30.637 require that state waters be free from substances from municipal discharges that will result in visible oil film or be present in concentrations in excess of 10 mg/L. YGBR will be required to monitor for oil and grease and will be held to the standard established in the general prohibitions.

- Concentration: MDL=10mg/L
- Monthly visual monitoring for oil and grease will be required.
- If visual monitoring indicates the presence of oil and grease, a grab sample must be collected. The facility must also collect one grab sample per year.

## B. Nonconventional Pollutants

**Total Residual Chlorine (TRC):** YBGR does not use chlorine in the wastewater treatment process, so monitoring requirements will be removed.

- Effluent monitoring requirements will be removed.

**Total Ammonia, as N:** Ammonia is a toxic pollutant typically found in domestic wastewater. YBGR has had ammonia limits since at least 1995. DEQ will carry forward the effluent limits developed and implemented in the 2015 Permit. These levels protect beneficial uses of the receiving water body. However, DEQ will require quarterly monitoring of ambient ammonia concentrations in Canyon Creek for potential reevaluation of the ammonia limits in the future.

- Concentration: AML=2.7 mg/L, MDL=5.9 mg/L.
- Weekly effluent monitoring requirements will be continued.
- Quarterly ambient pH and temperature monitoring requirements will be continued and quarterly ambient ammonia requirements will be added.

**Nitrate + Nitrite, as N:** Nitrate and nitrite are toxic components of total nitrogen and are commonly found in domestic wastewater. DEQ adopted a numeric human health standard of 10 mg/L for nitrate + nitrite, as N. In the 2015 Permit, YGBR was given a standard mixing zone with 100% dilution for chronic standard for nitrate + nitrite. As shown in *Table*, YGBR does not have RP to exceed water quality standards, even if no mixing zone is granted. Permit limits will be removed, but ambient and effluent monitoring will be required, as few data points were collected during the POR.

- Effluent limits will be removed.
- Monthly effluent and quarterly ambient requirements will be continued.

**Nutrients – Total Nitrogen, as N and Total Phosphorus, as P:** YGBR is located in the Northwestern Great Plains Ecoregion, which has seasonal nutrient standards from July 1<sup>st</sup> to September 30<sup>th</sup>. The facility is an infrequent discharger and had no discharge events from July to September in the POR, suggesting that discharge can be avoided in the summer months when nutrient standards apply. Therefore, YGBR will be prohibited from discharging from July 1<sup>st</sup> to September 30<sup>th</sup>, annually.

- Monthly effluent monitoring of total Kjeldahl nitrogen, total nitrogen, and total phosphorus will be removed.
- The facility will be prohibited from discharging July 1<sup>st</sup> to September 30<sup>th</sup> annually.

## VII. Final Effluent Limits

### A. Anti-Backsliding Analysis

DEQ considered the proposed limits to ensure this permit does not violate anti-backsliding policies. All proposed limits are as stringent or more stringent than the 2015 Permit, except nitrite + nitrate. However, YGBR upgraded their treatment facility in 2019, and CWA 402(o)(2) allows for a relaxation of limits if there have been substantial alterations or additions to the permitted facility. Therefore, removal of nitrite + nitrate limits does not violate anti-backsliding policies.

### B. Final Limits

The final effluent limits are a combination of TBELs and WQBELs developed in *Section IV* and *Section V*, respectively. Effluent limitations and conditions of reissued permits must be at least as stringent as those in the existing permit, with certain exceptions. The final effluent limits in *Table 12* will be applied to the discharge at Outfall 001 beginning on the permit effective date and lasting through the term of the permit. Discharge from YGBR must not violate the general prohibitions set forth in ARM 13.30.637.

Table 12. Final Effluent Limits – Outfall 001				
Parameter	Units	Average Monthly Limit <sup>(1)</sup>	Average Weekly Limit <sup>(1)</sup>	Maximum Daily Limit <sup>(1)</sup>
BOD <sub>5</sub>	mg/L	30	45	--
	lb/day	5.3	8.0	--
	% removal	85%	--	--
TSS	mg/L	45	65	--
	lb/day	8.0	11.5	--
	% removal	65%	--	--
pH	s.u.	6.0 – 9.0 <sup>(2)</sup>		
<i>E. coli</i> , Summer <sup>(3,5)</sup>	org/100mL	126	252	--
<i>E. coli</i> , Winter <sup>(4,5)</sup>	org/100mL	630	1,260	--
Oil and Grease	mg/L	--	--	10.0
Total Ammonia, as N	mg/L	2.7	--	5.9
(1) See definitions in Part V of the permit for explanation of terms. (2) Instantaneous minima and maxima. Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of the permit. (3) Limit applied from April 1 through October 31. (4) Limit applied from November 1 through March 31. (5) Geometric mean shall be reported if more than one sample is collected during the reporting period.				

## VIII. Monitoring and Reporting Requirements

Monitoring requirements are based on the type of treatment facility and the method of discharge. YGBR must comply with the sampling and reporting requirements listed below.

- Analysis must meet any Required Reporting Values (RRVs) listed in the latest version of Circular DEQ-7 unless otherwise specified, in writing, by DEQ.
- For the duration of the permit, YGBR must submit NetDMRs results for each month by the 28<sup>th</sup> of the following month.
- Samples shall be collected, preserved, and analyzed in accordance with approved procedures listed in 40 CFR 136.

### A. Effluent Monitoring

Effluent monitoring requirements for YGBR are presented in *Table 13*.

- The facility must monitor their effluent at the effluent vault prior to discharge at Outfall 001.
- Samples should reflect the typical volume and nature of discharge of the facility.
- All analytical results below the method detection limit should be reported as “non-detect” (NODI Code B). If individual samples are below the detection limit, the detection limit (not zero) should be used to calculate average values.

### B. Influent Monitoring

YGBR must monitor influent BOD<sub>5</sub> and TSS to calculate percent removal. Influent samples shall be collected from the lift station immediately upstream of the lagoons. Influent monitoring requirements are presented in *Table 13*.

**Table 13. Monitoring Requirements**

Parameter <sup>(1)</sup>	Units	Sample Type <sup>(2)</sup>	Sample/Calculation Frequency	Reporting Requirement	RRV <sup>(3)</sup>
Flow	mgd	Instantaneous	5 Days/Week	Daily Maximum Monthly Average	--
Duration of Discharge	days/month	Calculated	1/Day	Monthly Total	--
5-Day Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L	Composite	1/Week	Weekly Average Monthly Average	2
	% removal	Calculated	1/Month	Monthly Average	--
	lb/day	Calculated	1/Month	Weekly Average Monthly Average	--
BOD <sub>5</sub> - Influent	mg/L	Composite	1/Week	Monthly Average	2
Total Suspended Solids (TSS)	mg/L	Composite	1/Week	Weekly Average Monthly Average	10
	% removal	Calculated	1/Month	Monthly Average	--
	lb/day	Calculated	1/Month	Weekly Average Monthly Average	--
TSS- Influent	mg/L	Composite	1/Week	Monthly Average	10
pH	s.u.	Instantaneous	1/Week	Daily Minimum Daily Maximum	0.1
<i>E. coli</i>	org/100 mL <sup>(4)</sup>	Grab	1/Week	Weekly Geometric Mean Monthly Geometric Mean	1/100mL
Oil and Grease	Presence	Observation	1/Week	Presence/Absence	--
	mg/L	Grab	1/Year <sup>(5)</sup>	Daily Maximum	1.0
Total Ammonia, as N	mg/L	Composite	1/Week	Daily Maximum Monthly Average	0.07
Nitrate + Nitrite, as N	mg/L	Composite	1/Month	Monthly Average	0.02
<sup>(1)</sup> All parameters are effluent unless otherwise noted. <sup>(2)</sup> See definitions in Part V of the permit for an explanation of terms. <sup>(3)</sup> Required reporting value. If reporting non-detects, analysis must achieve these or lower RRVs. <sup>(4)</sup> May be reported as mpn/100 mL or cfu/100 mL. <sup>(5)</sup> A sample must also be taken any time the visual presence of oil is observed.					

### C. Ambient Monitoring

YGBR will be required to continue ambient monitoring for temperature, pH, and nitrate + nitrite.

- Monitoring must take place on Canyon Creek at a consistent location upstream and outside the influence of Outfall 001 with sample type, frequency, and RRVs as identified in *Table 14*.

<b>Table 14. Ambient Monitoring Requirements</b>				
<b>Parameter</b>	<b>Units</b>	<b>Sample Frequency</b>	<b>Sample Type <sup>(1)</sup></b>	<b>RRV<sup>(2)</sup></b>
pH	s.u.	1/Quarter	Instantaneous	0.1
Temperature	°C	1/Quarter	Instantaneous	0.1
Total Ammonia, as N	mg/L	1/Quarter	Grab	0.07
Nitrate + Nitrite, as N	mg/L	1/Quarter	Grab	--
(1) See definitions in Part V of the permit for an explanation of terms.				
(2) Required reporting value. If reporting non-detects, analysis must achieve these or lower RRVs.				

## IX. Special Conditions

See the permit for special conditions regarding the operation and maintenance manual, sewage sludge, and pretreatment requirements.

## X. Public Participation

### A. Public Notice

DEQ issued Public Notice No. MT-22-14 dated July 11, 2022. The public notice states that a tentative decision has been made to issue an MPDES permit to the Permittee and that a draft permit, fact sheet and environmental assessment (EA) have been prepared. Public comments are invited any time prior to the close of the business on August 10, 2022. Comments may be directed to:

Department of Environmental Quality  
Water Protection Bureau  
PO Box 200901  
Helena, MT 59620  
or  
DEQWPBPublicComments@mt.gov

All comments received or postmarked prior to the close of the public comment period will be considered in the formulation of the final permit. DEQ will respond to all substantive comments and issue a final decision within sixty days of the close of the public comment period or as soon as possible thereafter.

All persons, including the applicant, who believe any condition of a draft permit is inappropriate or that DEQ's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, shall raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing).

### B. Notification of Interested Parties

Copies of the public notice were mailed to the discharger, state and federal agencies and interested persons who have expressed an interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this permit. In addition to mailing the public notice, a copy of the notice and applicable draft permit, fact sheet and EA were posted on DEQ's website for 30 days.

Any person interested in being placed on the mailing list for information regarding this MPDES permit should contact DEQ, reference this facility, and provide a name, address, and email address.



### C. Public Hearing

During the public comment period provided by the notice, DEQ will accept requests for a public hearing. A request for a public hearing must be in writing and must state the nature of the issue proposed to be raised in the hearing.

### D. Permit Appeal

After the close of the public comment period, DEQ will issue a final permit decision. A final permit decision means a final decision to issue, deny, modify, revoke and reissue, or, terminate a permit. A permit decision is effective 30 days after the date of issuance unless a later date is specified in the decision, a stay is granted, or the applicant files an appeal pursuant to 75-5-403, MCA.

YGBR may file an appeal within 30 days of DEQ's action to the following address:

Secretary, Board of Environmental Review  
Department of Environmental Quality  
1520 East Sixth Avenue  
PO Box 200901  
Helena, MT 59620-0901

### E. Additional Information

Requests for additional information or questions regarding this permit should be directed to the Water Protection Bureau at 406-444-5546.

## XI. Information Sources

Administrative Rules of Montana Title 17 Chapter 30 – Water Quality

Subchapter 2 – *Water Quality Permit and Application Fees*

Subchapter 5 – *Mixing Zones in Surface and Ground Water*

Subchapter 6 – *Montana Surface Water Quality Standards and Procedures*

Subchapter 7 – *Nondegradation of Water Quality*

Subchapter 12 – *Montana Pollutant Discharge Elimination (MPDES) Standards*

Subchapter 13 – *Montana Pollutant Discharge Elimination (MPDES) Permits*

Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§ 1251-1387, October 18, 1972, as amended 1973-1983, 1987, 1988, 1990-1992, 1994, 1995 and 1996.

Montana Code Annotated (MCA), Title 75-5-101, *et seq.*, “Montana Water Quality Act,”.

Montana Department of Environmental Quality. *Clean Water Act Information Center (CWAIC)*.

<https://clean-water-act-information-center-mtdeq.hub.arcgis.com>. Accessed May 2022.

Montana Department of Environmental Quality. Department Circular DEQ-7, Montana Numeric Water Quality Standards, June 2019.

Montana Department of Environmental Quality. *2020 Water Quality Integrated Report*, Appendix A- Impaired Waters, January 2021.

Montana Department of Environmental Quality. MPDES Permit Number MT0020460.

- Administrative Record
- Renewal Application Forms DEQ Form 1 and Form 2A, Received December 2019.

National Water Quality Monitoring Council. *Water Quality Portal*. <https://www.waterqualitydata.us/>. Accessed June 2022.

Regensburger, Eric. Montana Department of Environmental Quality Water Quality Monitoring and Assessment Section. Personal communication. May 2022.

U.S. Code of Federal Regulations, 40 CFR Parts 122-125, 130-133, 136 and 442.

U.S. Environmental Protection Agency. *NPDES Permit Writers' Manual*, EPA 833-B-96-003, September 2010.

U.S. Environmental Protection Agency. *EPA Region VIII Mixing Zones and Dilution Policy*, December 1994 (Updated September 1995).

U.S. Environmental Protection Agency. *Technical Support Document for Water Quality-Based Toxics Control*, EPA/505/2-30-001, March 1991.

U.S. Geological Survey. StreamStats: Streamflow Statistics and Spatial Analysis Tools for Water-Resources Applications. <http://streamstats.usgs.gov/>. Accessed May 2022.

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